THE PA ON MOUNT ROSKILL, AUCKLAND (N42/11): DATING EVIDENCE FROM THE 1961 EXCAVATIONS

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Abstract. Salvage excavations on Mount Roskill, Auckland, were undertaken in 1961 by R. C. Green, L. M. Groube and F. W. Shawcross in advance of reservoir construction. It was found that the crater rim had been defended by a double palisade; a series of inter-cutting storage pits of two or three periods were examined. Radiocarbon dating of stratified charcoals showed that the main occupation lay within the period A.D. 1430-1620; the latest series of pits were undated. It is likely that the pa was abandoned after about A.D. 1700.

Mount Roskill (Puketapapa) is one of the Auckland volcanic cones situated on the southern side of the isthmus, about 2 km from the Manukau harbour at Blockhouse Bay (Fox 1977: fig. 1). Today it is surrounded by streets of small houses and by the main thoroughfare of Dominion Road. There is a small recreation area named Winstone Park at the base of the hill on its northern side and the whole forms a Public Reserve administered by the Mount Roskill Borough Council. There is now a sealed road to the hill top where an underground reservoir was constructed in 1961-2 by the Auckland City Council and subsequently transferred to the Auckland Regional Authority.

Originally, Mount Roskill was a dual crater showing at least two foci of eruption dating from late Pleistocene times and with the lava flowing south and east towards Oakley creek and Mount Albert (Searle 1964: 66 and fig. 11). The external slopes of the crater were extensively modified by the Maori people to form a series of terraces for living sites and stores. In the southern portion there are three or four tiers of terracing along the contour, ending on the east above Dominion Road as shown on the air photograph (Fig. 1). These terraces vary in length and some are divided into segments by ridges of unquarried hillside. The uppermost terrace continues round the northern portion of the hill. Storage pits are visible on most of the terraces as well as many exposures of shell midden, mainly small cockles and a few scallops. The rim of the crater was much altered when the reservoir and the road were built but two raised portions still survive intact. The northern eminence of 335 ft (102 m) is squarish and appears to have been made defensible by means of steep artificial scarps on the north and east sides and by two terraces on the west (Fig. 2). It may be interpreted as a strongpoint or *tihi* similar to those on other terraced pa in Auckland, as for example Mount Eden (Fox 1977: 5), though on a smaller scale. The southern eminence, 340-350 ft (104-107 m) high, has been defined by transverse scarps at either end; on the top there are two very large storage pits and at least four smaller ones; it can be deduced that this was primarily a defensible food store. There are no earthwork defences on Mount Roskill, such as occur on Mount Hobson or One Tree Hill and which are held to be a late feature (Fox 1977: 7), but in other respects it is a typical terraced pa of the Auckland series, which is attributed to the Waiohua people. The date of the occupation, therefore, is of much importance could it be established on archaeological grounds.

Fig. 1. Air photo of Mount Roskill before the construction of the reservoir and access road. The sites of the 1961 excavations are marked in white. (Photo: Whites Aviation.)

Fig. 2. The northern *tihi* on Mount Roskill, looking towards the Three Kings, about A.D. 1900. Site of the 1961 excavations was in the foreground. (Photo: Percy Smith colln, Auckland Institute and Museum.)

Before the reservoir was constructed in 1961-2 an archaeological investigation was carried out by the Anthropology Department, Auckland University, directed by Roger Green, L. M. Groube and Wilfred Shawcross. A brief account was published by Shawcross (1962: 81) and the finds and photographs were deposited in the Department. The notebooks and drawings were taken to Canberra by Shawcross but Xerox copies have recently been made available. The finds have now been placed in Auckland Museum and Green suggested that I should prepare a report for publication. Among the finds, there were four samples of stratified charcoals which the excavators had selected as suitable for radiocarbon dating, a process which was not easily obtainable at that time. The woods have now been identified by Dr Molloy and the samples analysed by the D.S.I.R. Nuclear Sciences Laboratory; the results are tabulated in Appendix 1. Human bones from three burials found during the excavations have been examined by Dr P. Houghton of Otago Medical School and his report appears as Appendix 2.

THE EXCAVATIONS

Two areas were uncovered during the six weeks of excavation but no overall location plan has survived: the sites have been indicated approximately by Roger Green on the air-photo (Fig. 1). Area I was situated on the upper edge of the crater adjoining the northern strongpoint or *tihi*, and Area II was on the top of the rim further to the south-east where two pits were visible. A 60 ft (18.3 m) long section trench was also cut mechanically down the inner slope of the crater revealing a terrace with remains of occupation (Fig. 3). There was a small hearth in a dark humic layer in which obsidian pieces were found, covered by a slip of scoria. There were also some human bones (Appendix 2, Burial 3).

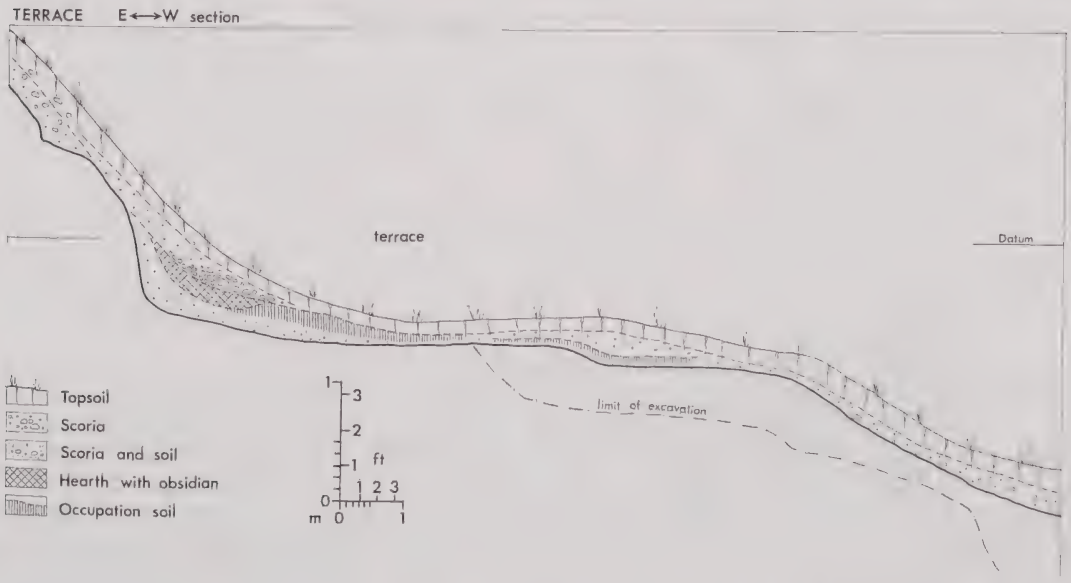


Fig. 3. Section of the inner slope of the crater, south of Area I.

Area II, the defences

No plans or notes are available for Area II, except for the diagram and brief remarks in the interim report (Shawcross 1962: 81). The excavation measured approximately 60 x 50ft (18.3 x 15.2 m) and was dug in a series of 10ft (3 m) squares. Five storage pits, M to Q, were excavated, but more important were the indications of a defence system.

Three lines of postholes are shown on the diagram plan (Fig. 4). The outer two lines were built on a narrow platform or terrace at the edge of the external slopes and in the original faded photos appear to be a major defensive work. They consisted of an irregularly spaced row of 5 or 6 postholes, 2 to 4ft (0.6-1.2 m) apart, in front of a row of wider-spaced holes, 8 to 10ft (2.4-3.0 m) apart, the latter linked by a narrow bedding trench (Fig. 5). This trench could have held either a series of small uprights lashed to each

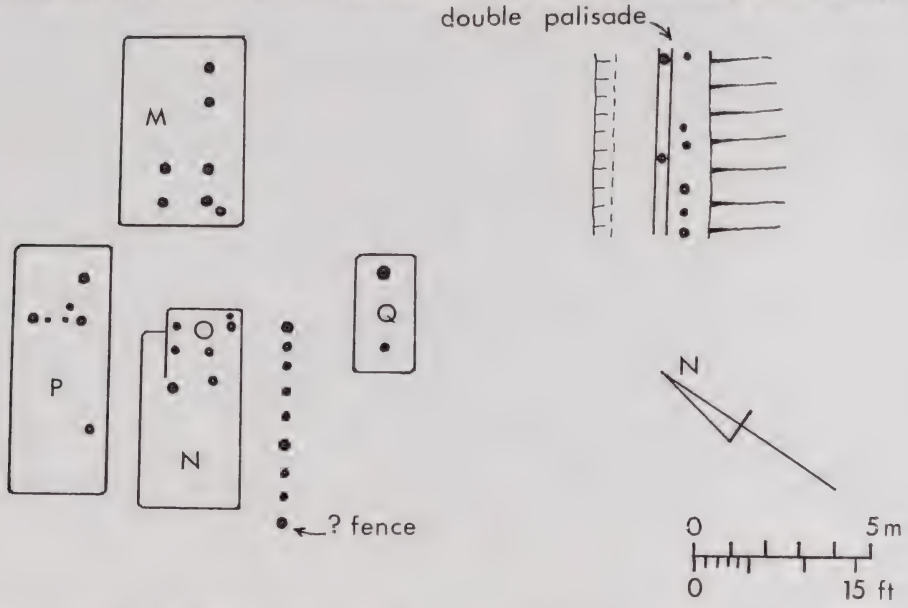


Fig. 4. Area II. Diagram plan, showing position of the defences.

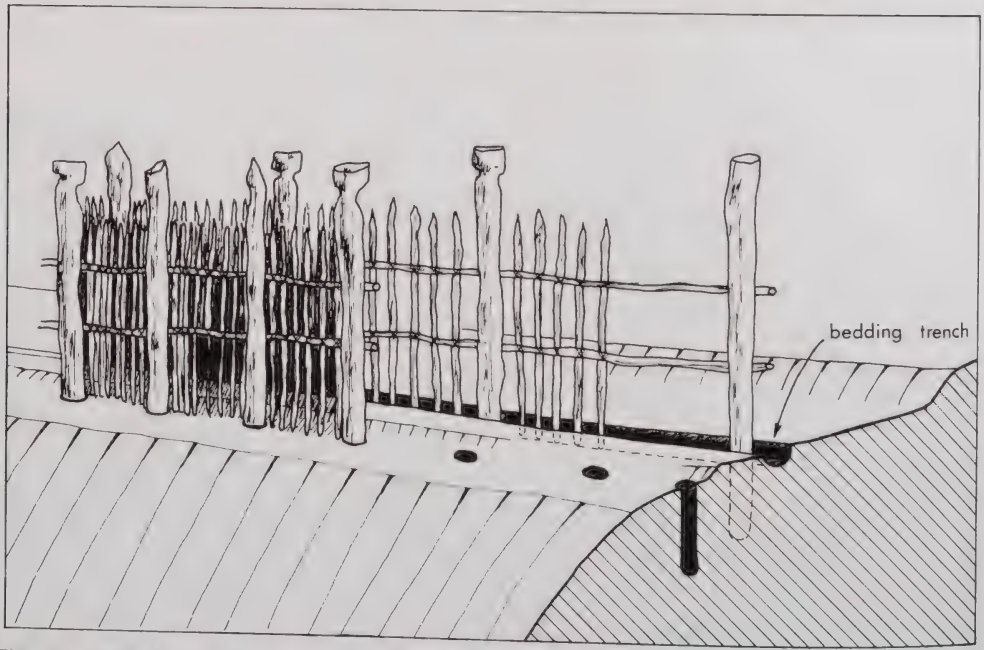


Fig. 5. Area II. Reconstruction of the defences. Main uprights of the inner palisade are shown as 3 m high and bedded 0.75 m into the ground. (Drawn by Caroline Phillips.)

other and to the main timbers, or else a horizontal timber or sleeper beam against which the small uprights were placed for greater firmness in the loose scoria. Such a horizontal timber would also lock the main uprights in position and so strengthen the whole line. It is unfortunate that no dimensions of the postholes were recorded but there is sufficient evidence to make a reconstruction sketch of the double palisades (Fig. 5). A double palisade is unusual, though Cook and Banks recorded "two rows of picketing" in association with earthwork defences at Wharetaewa pa in Mercury Bay in 1769 (Beaglehole 1955: 198). The third line of postholes was about 35ft (10.7 m) to the north on the flat portion of the crater rim and near the five storage pits (Fig. 4). It consisted of 9 close-set postholes, 3 to 4ft (0.9-1.2 m) apart, but probably the line extended beyond the area shown on the diagram. These posts could have been part of an earlier line of palisade, but are more likely to have belonged to a fence for a property division, such as Augustus Earle drew at Rangihoua pa in the Bay of Islands (Murray-Oliver 1968: Pl. 33).

Area I, pit storage

The area excavated consisted of fifteen 10ft (3 m) squares dug with 2ft (60 cm) wide balks between, most of which were subsequently removed (fig. 6). A complex of 11 storage pits was uncovered, some cutting into each other and some placed on differing alignments. Most had been filled deliberately and were level with the present surface, but the three largest pits, A, B and C, showed as shallow depressions. All had rows of postholes cut in the scoria on the pit floor (Figs. 9-11) which had held timber uprights acting as roof supports (Fox 1974: 142). There was a side "buttress" in Pit D, which presumably was a step at the entrance to the roofed store, as found in pits of the first occupation at Skippers' Ridge, Coromandel (Davidson 1975: 18 and fig. 2). The filling usually consisted of three layers: layer 1, surface deposits; layer 2, dark humic soil, in some cases containing midden material, charcoal and burnt stones, indicating the hollow had been used as a rubbish deposit; layer 3, fine loose scoria which had slipped down from the pit walls (Figs. 7, 8).

In Pit B the humic layer was absent and the pit appears to have been filled up in pre-historic times with scoria and some large stones. In contrast Pit A had been filled in recent times with loose rubble and boulders above the primary slip, which suggests the pit was open at a late date (Fig. 7).

A construction sequence was established by Shawcross (1962: 83) and was further discussed by Green (1970: 39-40). It is clear from the plan (Fig. 6) that Pits D, G, I, and K, were the earliest; with the exception of G, all had a single central row of posts. Pit D was very shallow, only 11ins (28 cm) deep in the scoria (Fig. 8, section). All four had been cut into by smaller pits, E, F and H (Fig. 6, plan). Pit E was on a markedly different alignment to the earlier series. Pits A, B and C were three large pits with multiple rows of posts on the same alignment as Pit E, and therefore must be considered to be late constructions on the stratigraphical evidence. Pit C, which contained a human burial, also cut into the corner of the early shallow pit D. Pit J had also been reduced in size and re-used (Fig. 8).

A small stone edged hearth was found near the south edge of Pit C (Fig. 12); it was quadrangular, measuring approximately 2ft 6ins (0.8 m) square internally and enclosed by 5 large slabs and two small ones.

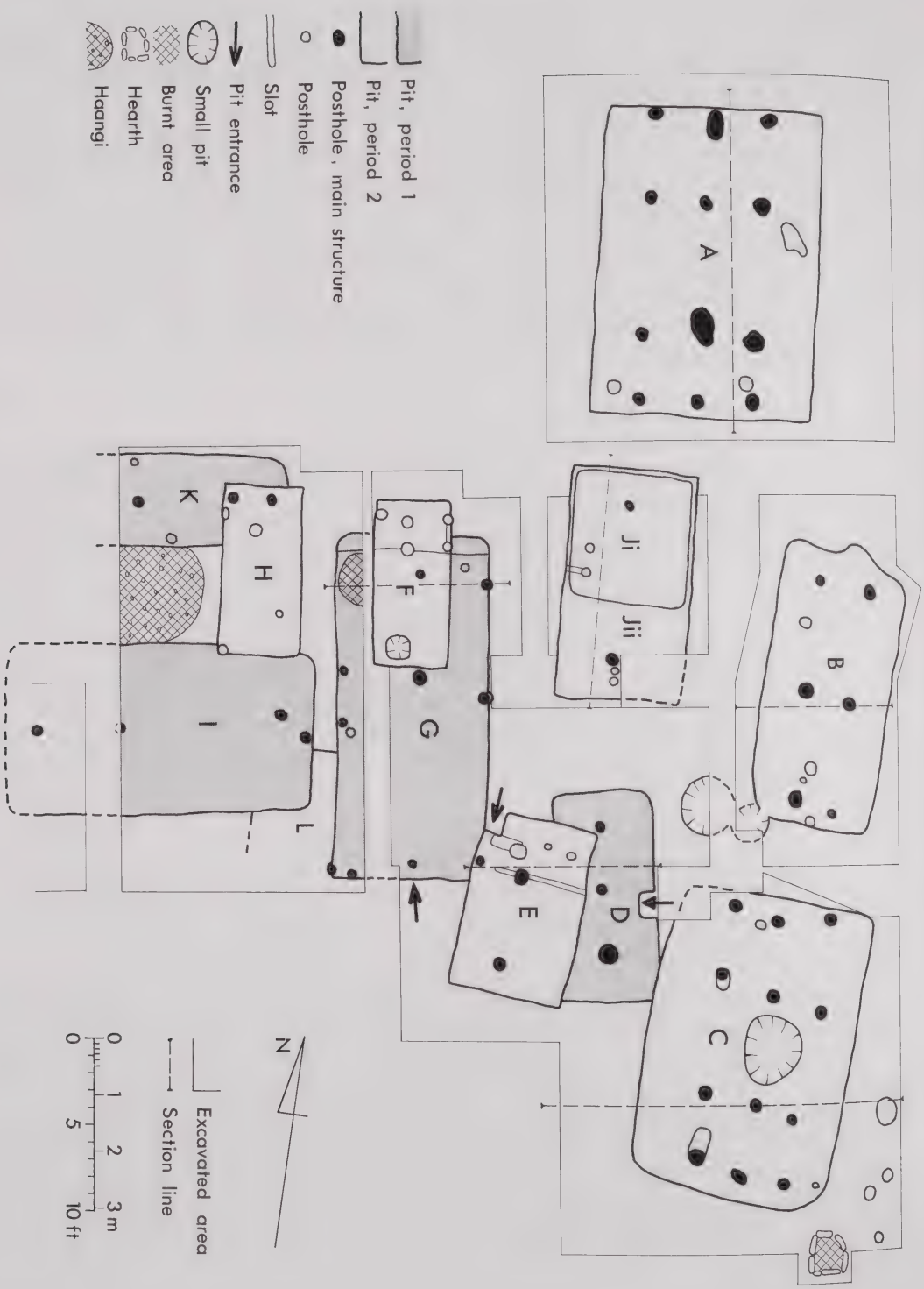
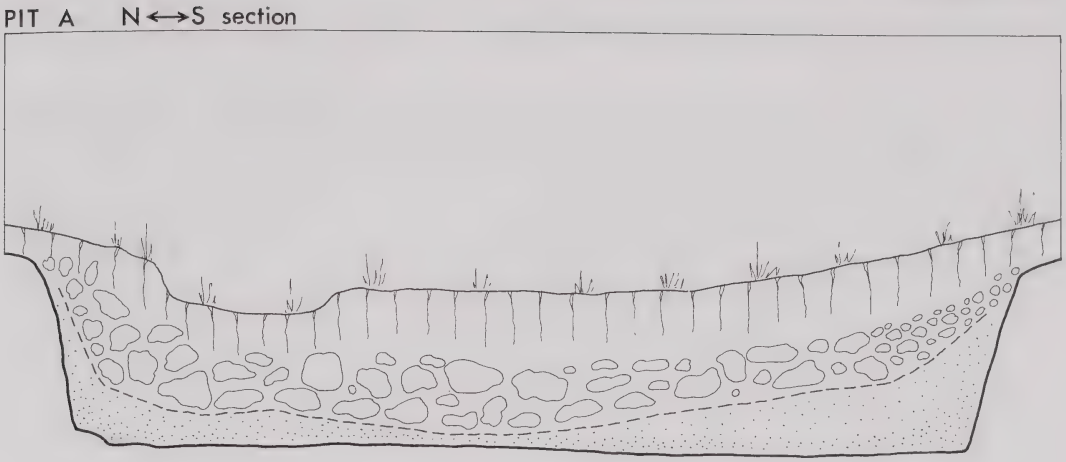
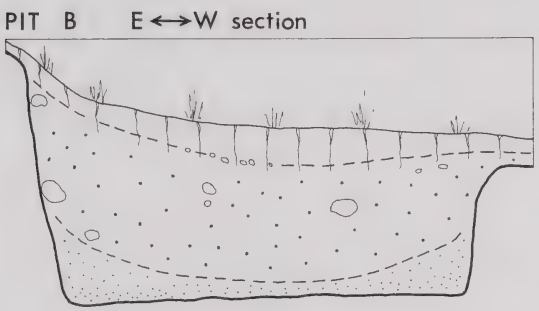
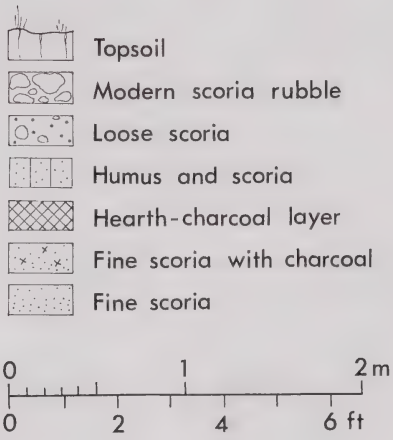


Fig. 6. Area I. Plan: the earlier pits are shaded.







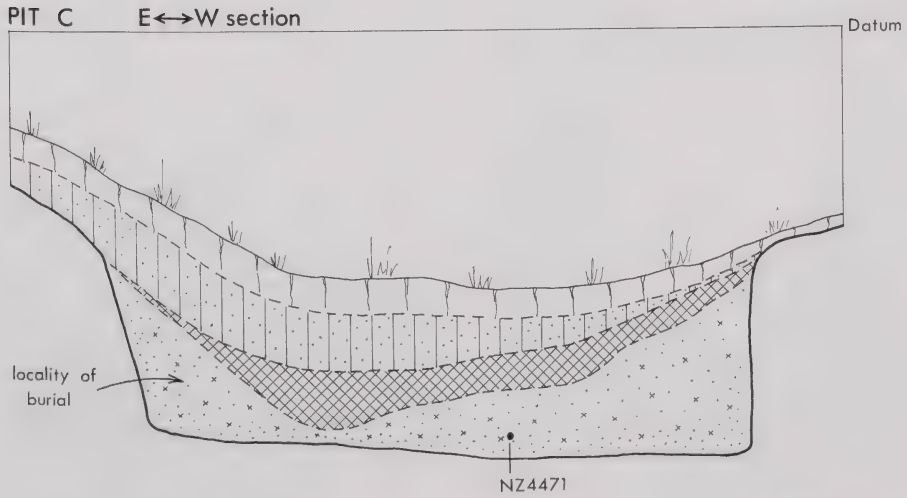


Fig. 7. Area I. Sections of pits: for position see Fig. 6.

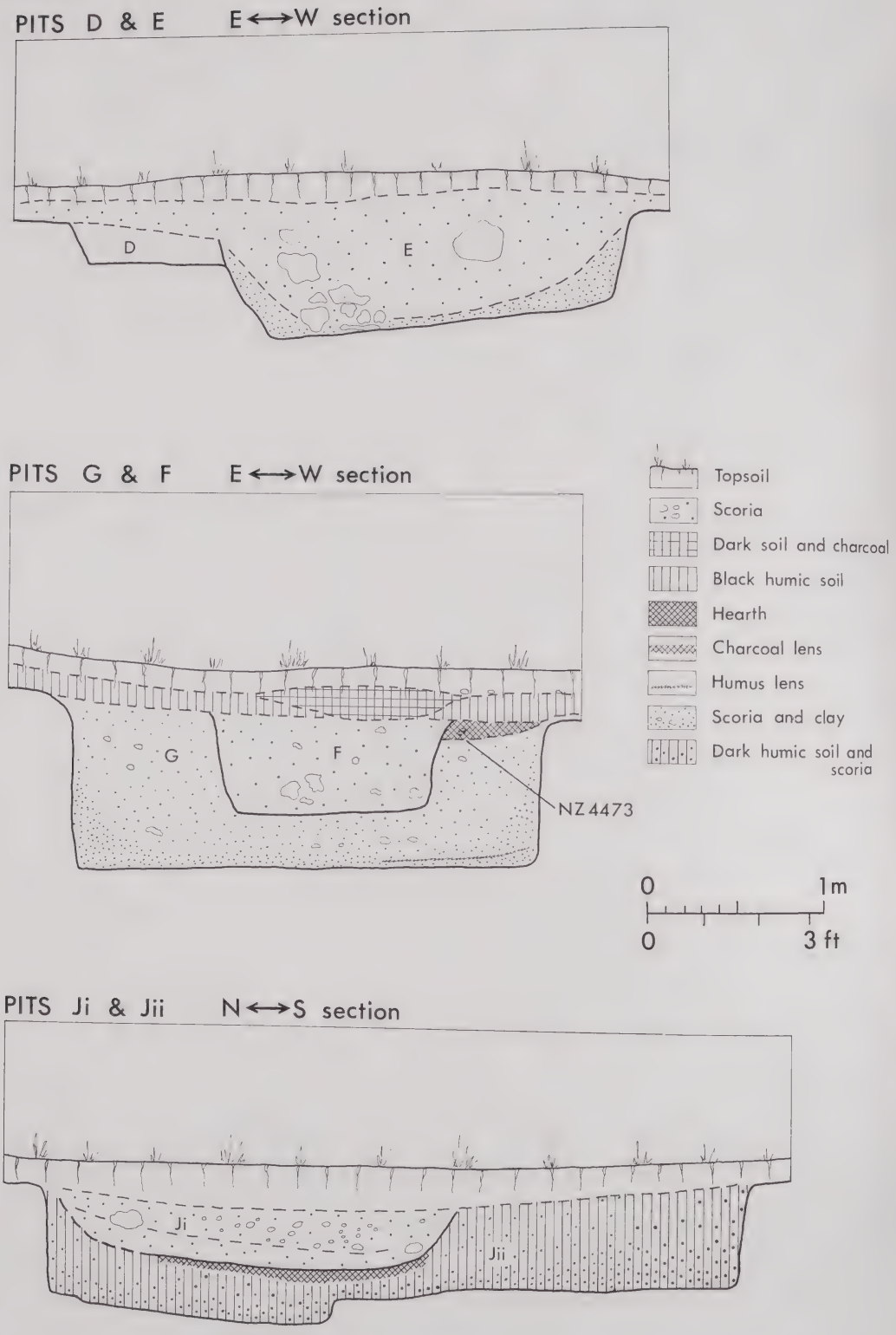
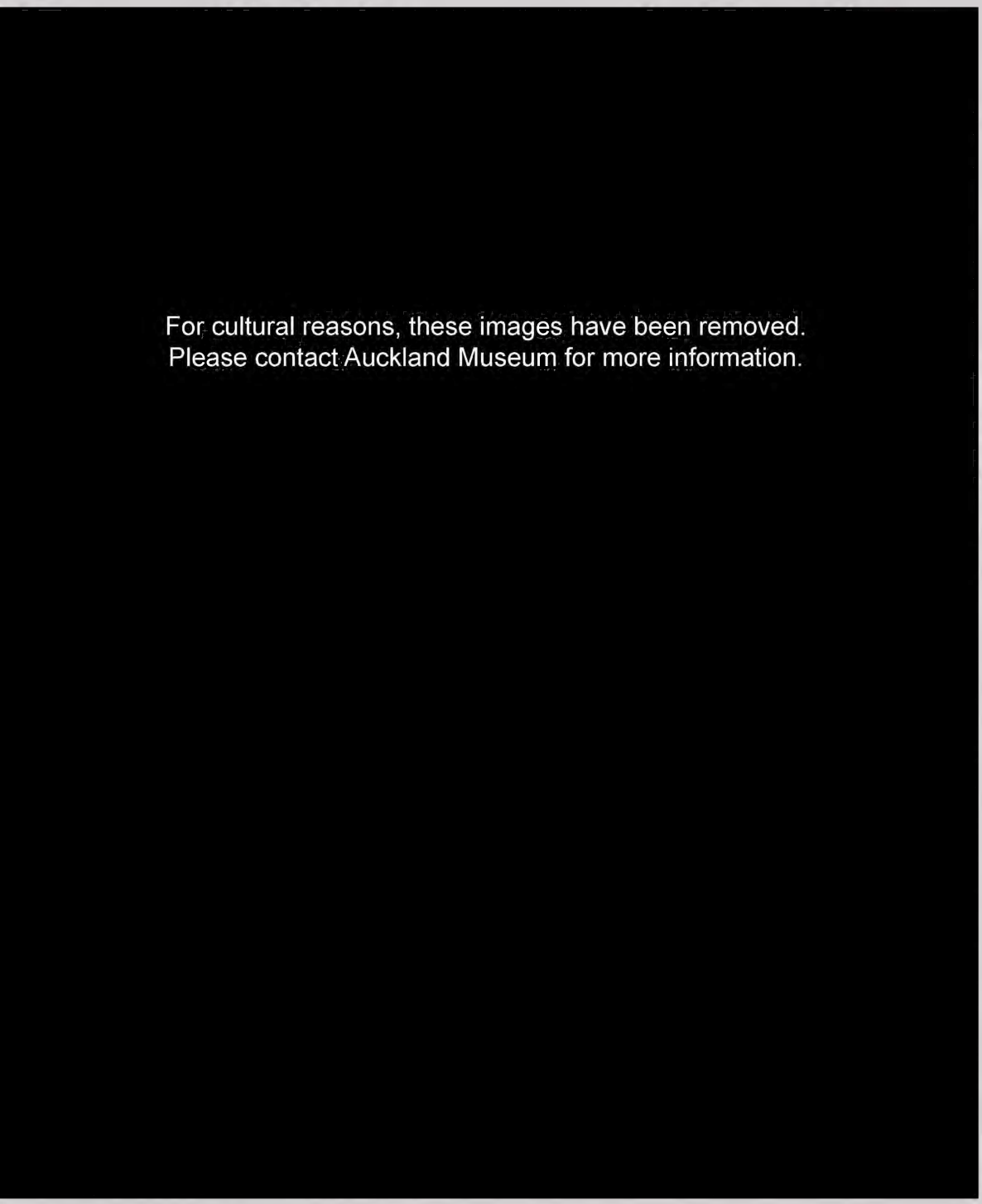


Fig. 8. Area I. Sections of intercutting pits: for position see Fig. 6.



Figs. 9-12. Area I. 9. Pit A, showing multiple rows of postholes for roof supports. 10. Pit C, showing postholes for roof supports and floor pit. 11. Intercutting pits F and G, showing side posts and bedding trench for pit lining in Pit F. 12. Stone-edged fireplace near Pit C. (Photos: Anthrop. Dept., Auckland University.)

THE CARBON SAMPLES

Wood identifications and radiocarbon dates are given in Appendix 1.

The earliest dated sample (NZ 4473) was obtained from a hearth in the filling of Pit G (Fig 8). This was a large pit 19ft 9ins (6 m) long, 8ft 6ins (2.6 m) wide and up to 3ft 6in (1 m) deep. It had one large central post and 3 others visibly slotted into each of the side walls (Fig. 11). These must have held a lining or revetment to prevent loose scoria falling on to the floor; several other examples of uprights for pit linings have been recorded (Fox 1974: 149), including one in Auckland in Alberon Park, Parnell. There was an external ledge at the southern end of the pit, indicating an original entrance to this end. The bottom of the pit was covered with loose red soil and scoria to a depth of 9 to 12ins (23-30 cm), which had fallen from the walls presumably after the lining had been removed. It covered a thin layer of humus which had accumulated on the pit floor while it was in use. The pit was then filled up deliberately with 2ft (0.6 m) of scoria and stones, on top of which there was a hearth or hangi, containing burnt shells and the charcoal sample (Fig. 8). This was cut through when a smaller pit, Pit F, was dug at the northern end of Pit G, measuring 9ft 6ins (3 m) by 4ft 4ins (1.3 m), and only 2ft 4ins (0.7 m) deep. It too had a revetment lining, shown by a bedding trench between two postholes (Fig. 11) on the side wall. In due time pit F was also disused and filled with scoria, and dark soil and charcoal was then heaped over it (Fig. 8).

The charcoals from the hearth in Pit G were from totara and kohekohe trees with some *Coprosma* and yielded a corrected radiocarbon date of A.D. 1480 ± 50 (N.Z. 4473, 470 B.P.). A comparable date of A.D. 1510 ± 50 (N.Z. 4553) was obtained from totara and kohekohe charcoals at the bottom of Pit I. This was another large pit, 16ft (4.9 m) long 9ft 7 ins (2.9 m) wide with a central row of three or four postholes (Fig. 6). These two finds indicate there was occupation on Mount Roskill probably before A.D.1500, since the charcoals from Pit G were from a secondary deposit.

Another slightly later sample relates to Pit C. This measured 17ft (5.2 m) by 13ft 3ins (4 m) and was 3ft 4ins (1 m) deep on the lower side, 5ft (1.5 m) deep on the upper. It was an aisled pit, with 3 longitudinal rows of 4 postholes, some of which showed signs of replacement and enlargement (Fig. 6). The centre row will have carried the ridge pole, with secondary horizontals on either side (Fox 1974: 146). In the centre there was a small round floor pit (Fig. 10) probably a receptacle for selected kumara tubers for replanting as found at Station Bay on Motutapu (Sullivan 1972: 39, fig. 3). The charcoals were obtained from layer 3 'a loose fine-grained scoria with charcoal' which covered the floor of the pit (Fig. 7, section), and were probably derived from fires lit to disinfect the pit from time to time (Fox 1975: 204). The sample consisted of twigs of *Hebe* and *Coprosma* species, and yielded a corrected radiocarbon date of A.D.1560 ± 60 (N.Z. 4471). The same layer, which in places appears to have been quite deep, also contained an articulated human burial though this is not shown on the originals of the plan (Fig. 6) or section (Fig. 7). These primary deposits were sealed by a layer of black midden soil in which there were some large stones and a cooking hearth (layer 2). The fourth sample (N.Z.4472) was obtained from the stone-edged hearth (Fig. 12) on the level ground close to Pit C. This produced a date of A.D.1570 ± 50, and indicates that the use of the pit and the hearth were contemporary.

These finds show that there was agricultural activity by the people living on Mount Roskill throughout the 16th century. Whilst there is nothing to indicate occupation after A.D.1620, it must be remembered that no dating evidence was obtained from any of the small secondary pits E, F and H which were clearly constructed when the earlier pits, I and G were out of use. It is interesting to see that the earlier charcoals contain a high proportion of tree pollen, totara and kohekohe, whilst the two later samples are derived from shrubby species, *Coprosma, Hebe* and *Letospermum.* This may reflect the clearance of forest from the Auckland volcanic soils in the first half of the 16th century.

THE BURIALS

The evidence of the burials must now be considered; detailed results are given in Appendix 2. Three lots of human bones were found, all in Area I. Burial 1 was identified by Philip Houghton as that of an adult Polynesian male, aged 40 or more. The bones were catalogued as from "the south end of square E7, layer 3", the greater part of which lies within Pit C (Fig. 6). The field notes with an accompanying sketch state that the articulated burial was in the lower layer (layer 3) and was sealed by dark soil with large stones (layer 2). The individual was lying on his left side with knees drawn up on the chest and arms bent upwards. It can be deduced that the corpse had been bound in this position before burial. The burial, however, is not shown on the original plan or section and presumably was removed by the excavators before the drawings were done. Houghton's examination of the nitrogen content of the bones indicated that the burial was 'certainly before A.D.1500 and probably 13th century'. These dates are not in accord with the archaeological evidence, unless it is assumed that a 200 year old mummified corpse was re-buried in a pit in use in the 16th century.

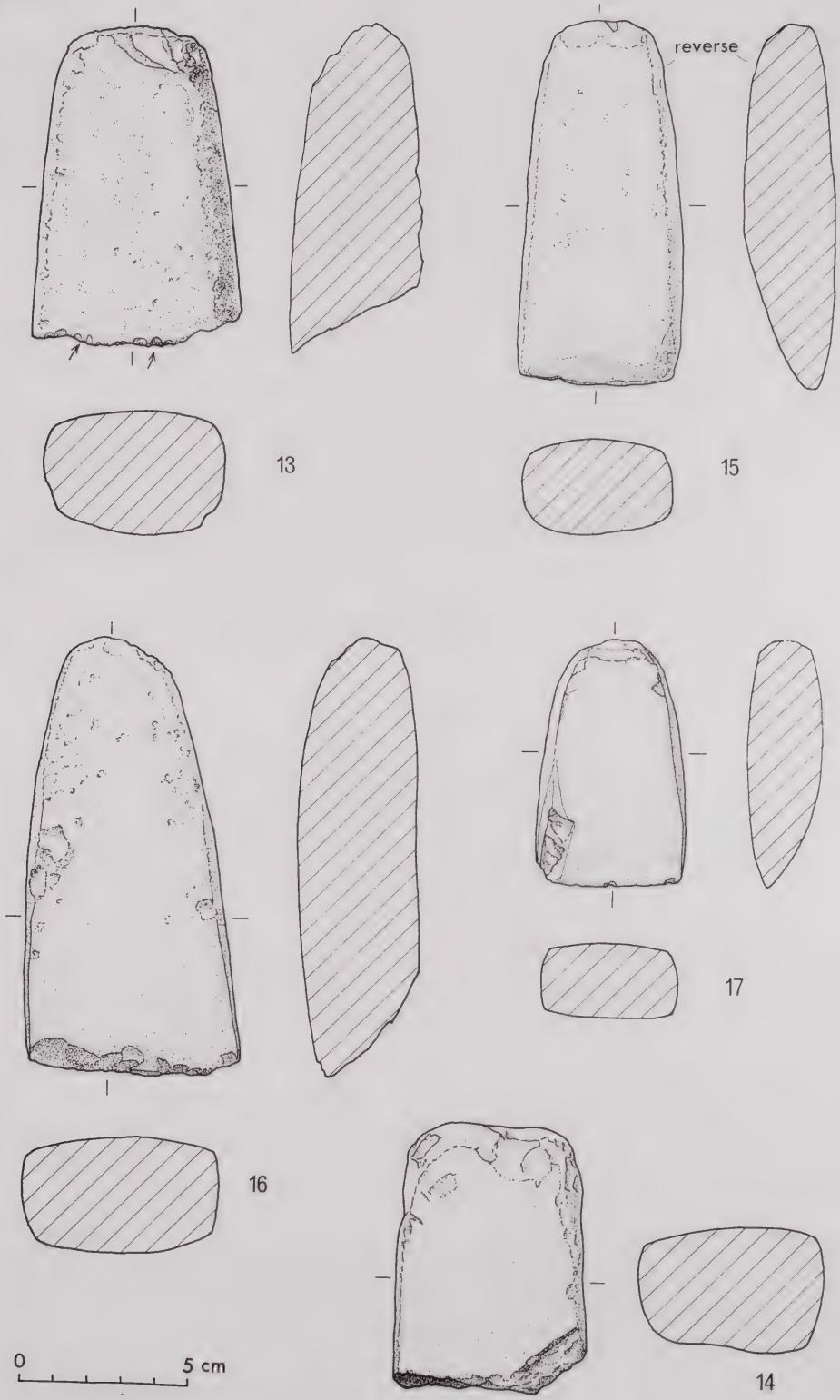
Burial 2 was recorded from Area I, square F2, layer 1: this was outside the area planned (Fig. 6) but close to Pit A. Since layer 1 is the uppermost layer in all sections, the burial must have been quite shallow, and presumably unstratified. The fragmentary remains were of an 18 year old individual, probably a male. Burial 3 was also from a superficial deposit; it is labelled "Trench top", which refers to the 60ft (18.3 m) long section trench cut down the inner slope of the crater by a machine; the burial is not shown in the drawn section (Fig. 3). Houghton reports that the scanty remains belong to two individuals, a 5 year old child and an adult, probably a female. The nitrogen content of all three is similar to that of Burial 1, again suggesting to Houghton 'burial in the 13th century'.

THE FINDS

The objects found were numbered and catalogued by the Anthropology Department. The more important are illustrated or described below, together with three adzes and a small wooden image found casually on Mount Roskill previously.

Adze, Type 2 B (Fig. 13), broken 92 mm from the butt. Greywacke, dark greenish grey, with remains of polish on one face and both sides. The fragment appears to have been hammer-dressed and re-used; there is some fine retouch along the edge. Area I, between Pits B and C, unstratified (No. 443).

Adze (Fig. 14), broken 75 mm from the butt. Basalt, dark bluish grey polished surface. Simon Best kindly examined this specimen and reports that it is "almost certainly from the Tahanga quarries, Opito, Coromandel. Hand specimen: has the blue-grey colour



Figs. 13-17. Adzes from Mount Roskill.

which is often found on polished sections of Tahanga basalt. Thin section: appears identical to the majority of source specimens from the quarry, especially with regard to altered olivines and flow layered felspars. This specimen comes from the coarser end of the range of Tahanga basalt textures.'' Area I, Pit G, layer 2. (No. 767).

Three other adzes in the Auckland Museum collection are recorded from Mount Roskill and although not precisely located, have been included in this report.

Adze, type 2 B (Fig. 15), greywacke, or indurated sandstone, greenish grey, hammer-dressed, with remains of polish at base of blade and on one side. The blade has been blunted, presumably preparatory to re-sharpening. No. 29344:1 (1929).

Adze, type 2 B (Fig. 16), greywacke, or perhaps a basalt, grey polished surface. The blade is much worn, and re-sharpening has been attempted. No. 7787 (G. Graham collection, 1943).

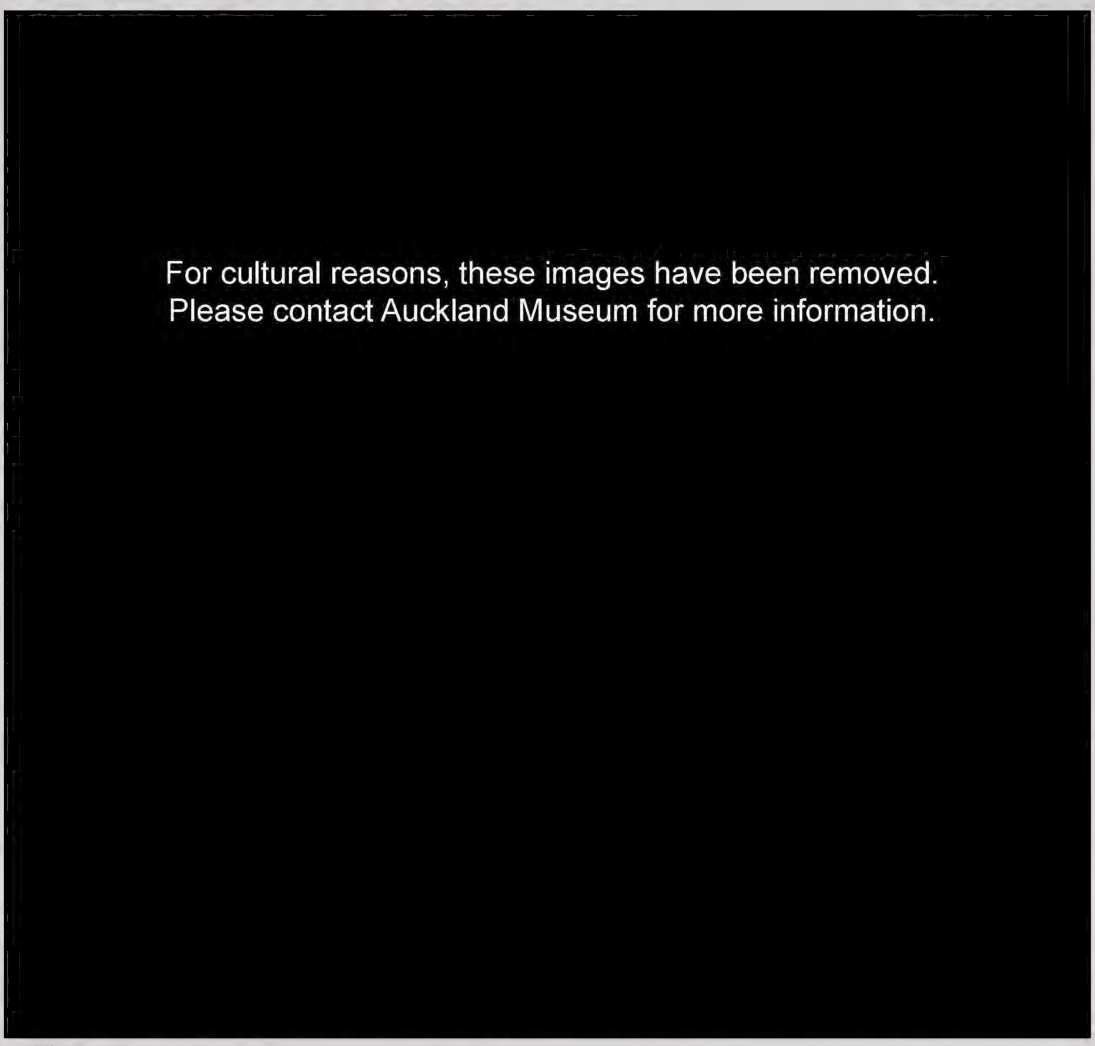
Adze, type 2 B (Fig. 17), argillite, black polished surface, apart from the butt which is roughened. No. 29344.2. (1929).

There were also 6 small chips of polished adzes, one (No. 765) probably of basalt, the others of greywacke; these were found in Area I in unstratified deposits or in layer 1, topsoil. Some indications of local stone working were recovered from a test square (B106) north of the pits in Area I, where a concentration of 62 small flakes of greywacke (No. 415) was uncovered at the bottom of layer 3. Other finds from this square include a drill point (No. 414) 7 pieces of chert (No. 416) 22 small bits of obsidian (No. 417), and three pieces of Waitemata sandstone used as polishers or files (No. 800). Other larger greywacke flakes came from layer 2 near the hearth beside Pit C as well as a greywacke core (No. 448) which had been used as a hammer stone.

Two small roundels, 2.5 and 2 cm in diameter (No. 760) shaped in reddish-brown clay, baked hard probably by volcanic action, were found in a test square (A 108) north of the pits in Area I. They were probably intended as beads: the larger has an 0.7 mm drilled perforation which in the smaller broken example was started but not completed.

A small wooden image (Figs. 18, 19), probably 'about 9 cms high', was brought to the excavations by a woman who said she had found it 'on the top of Mount Roskill' (Simmons pers. comm.). It was photographed and then returned to the finder; its present whereabouts are unknown. The little carved figure is naked with legs and arms bent and the hands resting on the abdomen. The back is flat but the prominent buttocks are carved in relief. The front of the round head is decorated with a diagonal patterning of incised lines and dots, which continue across the cheeks. The eyes are slits, slightly askew; the mouth is open with a triangular extended tongue.

This is a unique piece, but the discovery of a small image on the summit of a volcanic cone can be matched at One Tree Hill pa. The figure there was carved in pumice and probably was a container for tattooing pigments (Fox 1977: fig. 14). Mr D. Simmons has pointed out to me that a similar treatment of the head and face occurs on a stone image 15 cm high found at Northcote, on the Waitemata (Auckland Mus: No. 7104). This is double-sided, with male and female forms on opposite sides, each body being elaborately decorated. A deep groove across the base and continuing up the sides indicates that it was intended for suspension.



Figs. 18, 19. Wooden image found on Mount Roskill. 18. Front view. 19. Side view. (Photo: Anthrop. Dep., Auckland University.)

SUMMARY AND DISCUSSION

The excavations on Mount Roskill were essentially a salvage operation carried out under pressure over 18 years ago; it is therefore not reasonable to expect them to comply with present-day standards of methods and techniques. Some difficulties have been experienced in placing the drawn sections on the plan (Fig. 6) and the lack of dimensions of the posts and postholes has made interpretation of some structures uncertain. Nevertheless important results were obtained which have implications for the prehistoric Maori settlement of the Tamaki isthmus as a whole.

First, nothing was found to indicate that Mount Roskill was occupied in the Archaic phase, prior to A.D.1400-1450 apart from the conflicting evidence of the human bones. The earliest radiocarbon date from a secondary deposit in Pit G was A.D.1480 ± 50. This may be compared with the only previous uncalibrated C14 date of A.D.1440 ± 40 from a volcanic cone pa, derived from a midden pre-dating one of the lower terraces on Mount

Wellington (Golson 1960: 33). One of the two broken adzes of Type 2 B found in the excavations was a basalt from the Tahanga quarries in the Coromandel; it is a small specimen (Fig. 14) that Simon Best considers could be of 15th century date.

Secondly, the four radiocarbon dates differ little in time and allowing for the standard deviations, could all lie within the period A.D.1430-1620. Two were obtained from the primary deposit in storage pits C and I, one from a secondary hearth in the filling of Pit G. This is the first time that a series of dates has been obtained which reflect the principal period of occupation on one of the cones. It is likely, though by no means certain, that the double palisade defending the outer edge of the crater rim in Area II belongs to the same period. This is also the first time that defensive timber work has been located on a cone. Janet Davidson's excavation in 1972 demonstrated that there were no palisade postholes on one of the lower terraces at Mount Wellington (Davidson pers comm.). The discoveries at Mount Roskill suggest that in the event of a war-scare, the inhabitants of the lower terraces retreated up the slopes to find shelter on the crater rim behind the palisades.

It is clear that pit replacement and backfilling were common occurrences on Mount Roskill as elsewhere, and that the resulting hollows were used for sunk cooking hearths or *hangi* and as dumping places for shell midden. A stone-edged hearth (Fig. 12) on level ground close to one of the pits presumably was used for some special type of cooking, perhaps spit-roasting. The simple form of pit roofing with a ridge pole resting on a central row of timber uprights was characteristic of the earliest series of pits. The more complex aisled construction occurred in the later series of large pits on a different alignment (Fig. 6, Pit A,B,C). Nevertheless, the radiocarbon dates from Pit C indicate that this form was not much later, as they occur within one standard deviaation of the earlier dates.

Finally, it must be stressed that there is no radiocarbon dating evidence for the end of the occupation of the pa. The latest series of small pits (Fig. 6, E,F,H) did not yield any charcoal; for these a 17th century date seems reasonable. Nothing was found to indicate that the pa had been attacked or burnt and it seems unlikely that the occupation continued for long after A.D.1700. This accords with the traditional evidence set down in the Orakei Judgement by Mr Justice Fenton, in which Puketapapa is not mentioned among the pa belonging to the famous Waiohua chief, Kiwi Tamaki, in the mid-18th century (Fenton 1879:62). The absence of earthwork defences on Mount Roskill also suggests that the pa was abandoned before the attacks of Te Taou and the Ngati Whatua in the late 18th century.

Acknowledgements. I am much indebted to Professor Roger Green and Dr Wilfred Shawcross for releasing the material on which this report is based. All finds and notes are now deposited in Auckland Museum.

For assistance in the preparation of the report I am grateful to: Mr Simon Best for his identification of the stone material; Dr B. Molloy and the D.S.I.R., Nuclear Science Laboratory, for identification and analysis of the charcoals; Mr D. R. Simmons for making available adzes from the Museum collection, and for helpful recollections of the 1961 excavations; and finally to Caroline Phillips for her patience and skill in the preparation of the drawings.

APPENDIX I
Report on charcoal samples from N42/11

Wood identifications by Dr B. Molloy, D.S.I.R. Botany Division.

Radiocarbon dating by C. McGill, D.S.I.R. Nuclear Sciences Laboratory, Wellington.

		B.P.	*Corrected*	*A.D.*
N.Z. 4471		300 ± 60	390	1560 ± 50
Coprosma sp.	80%			
Hebe sp.(twigs)	20%			
Pit C, layer 3				
N.Z. 4472		290 ± 50	380	1570 ± 50
Coprosma sp.	46%			
Leptospermum sp. probably *L. scoparium*	42%			
Hebe sp.	12%			
Fireplace near Pit C, layer 2				
N.Z. 4473		440 ± 50	470	1480 ± 50
Dysoxylum spectabile	53%			
Podocarpus totara/hallii	31%			
Coprosma sp.	11%			
Unidentified	4%			
Pit G, hearth, layer 2, cut by Pit F				
N.Z. 4553		350 ±	440	1510 ± 50
Podocarpus totara/hallii	93%			
Dysoxylum spectabile	7%			
Pit I, layer 3				

APPENDIX 2
The Human Skeletal Material from Mt Roskill (N42/11)

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Burial 1. The fragmentary, incomplete remains of an adult Polynesian male aged 40+ years. This was a robust person, standing about 1711 mm (5'7⅓'') tall. No significant gross pathology is evident and the cause of death cannot be determined. A considerable number (12-15) of lines of arrested growth are apparent in the tibial X-ray. These have been formed between the ages of about 6 and 14 years, and suggest seasonal shortage of food rather than recurrent illness in this robust individual. Despite this suggestion, the general lack of joint degeneration for age implies that this individual had an easy physical existence, by the standards of New Zealand prehistory. There are no clavicular first-rib grooves, suggesting that canoe transport was not regularly used.

The only remaining teeth are two molars and an incisor. All are worn to the roots. This actually indicates a less abrasive diet than is usually found in New Zealand's later (post 1500) prehistoric period, where the same degree of wear is sometimes found in an individual some 20 years younger.

The nitrogen level of the bone is 1.08%, suggesting burial in the thirteenth century: the material is certainly pre-1500.

Burial 2. The fragementary, incomplete remains of an 18-year-old individual, about 1666 mm (5'5¾'') tall and probably a male. No significant pathology is evident and the cause of death cannot be determined. The femora are very bowed antero-posteriorly, with marked reduction of the transverse diameter of the shaft, but the incompleteness of the bones makes further comment impossible. The teeth show only slight wear, with the emphasis on the anterior dentition, the pattern which appears to be more typical of New Zealand's early prehistoric period. The upper incisors show many fine lines of enamel hypoplasia, and these are matched in the long bone X-rays by recurrent lines of arrested growth formed throughout childhood. This pattern again suggests seasonal food deprivation.

The nitrogen level of the bone is 1.03%, again suggesting burial in the thirteenth century.

Burial 3. Two individuals are scantily represented under this heading. A five-year old child is represented by some long bone and pelvic fragments. An adult, possibly female, is represented by most of a right ulna, and various other fragments. The morphology of the root of a second molar from this adult suggests an age of more than 25 years, yet the tooth shows minimal wear and salivary calculus, suggesting the softer diet more typical of the earlier prehistoric period. The nitrogen estimates on the bone of these two individuals are similar, 0.88% and 0.87%, suggesting they were interred together. The difference in level of nitrogen between these and Burials 1 and 2 is not significant, and they were probably interred at much the same time.

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